

ABSTRACT OF THE DISCLOSURE

[45] Semiconductor devices with highly reliable Cu interconnects exhibiting reduced resistance are formed by sequentially depositing a seed layer by PVD, depositing a conformal seed layer enhancement film by electroplating, and then thermal annealing the seed layer enhancement film in an inert or reducing atmosphere to expel impurities, enhance film conductivity, reduce film stress, increase film density, and reduce film roughness. Embodiments include single and dual Cu damascene techniques formed in dielectric layers having a dielectric constant no greater than about 3.9.